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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/546,494	04/10/2000	Ulf Ahlfors	6563/54132 (3964-11)	3411
27498	7590	01/31/2006	EXAMINER	
PILLSBURY WINTHROP SHAW PITTMAN LLP			NG, CHRISTINE Y	
P.O. BOX 10500			ART UNIT	
MCLEAN, VA 22102			PAPER NUMBER	
			2663	

DATE MAILED: 01/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/546,494

Applicant(s)

AHLFORS ET AL.

Examiner

Christine Ng

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 November 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-25 and 28-52 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4, 7, 11, 18, 21, 28-31, 34, 38, 45 and 48 is/are rejected.
- 7) ☒ Claim(s) 5, 6, 8-10, 12-17, 19, 20, 22-25, 32, 33, 35-37, 39-44, 46, 47 and 49-52 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 April 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 2, 3, 28, 29 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,549,938 to Kilkki et al in view of U.S. Patent No. 6,469,982 to Henrion et al.

Referring to claims 1 and 28, Kilkki et al disclose in a method for bandwidth scheduling in a switch (Figure 8) comprising a switching fabric (Figure 8, router 114) and a bandwidth scheduler (Figure 9; cell filter 164 and processor PL_a logic 180) located before any queue (Figure 9; real-time rt buffer 166 and non-real-time nrt buffer 168) of the switch. Refer to Column 7, lines 57-61; Column 12, lines 32-43; and Column 13, line 39 to Column 14, line 35. The method comprises:

Receiving a stream of data from the switching fabric. In a typical SIMA network, "all inputs, labeled input-1, input-2 through input-M are coupled directly to the router 114 to be routed to their corresponding scheduling and buffering unit, labeled SBU-1 116, SBU-2 118 through SBU-N 120". Refer to Column 12, lines 32-43.

Extracting flow identity information (Figure 9, priority level PL 156) from the stream. As shown in Figure 3, the priority level is computed using the measured bit rate MBR and the nominal bit rate NBR, and the MBR is measured based the connection

type (real-time or non-real-time). Therefore, the priority level reads on the flow identity since it distinguishes flows from each other; the priority level will be different depending on whether the connection is real-time or non-real-time. Cells will have different PL's depending on the connection type and MBR. Refer to Column 6, lines 35-44; Column 8, lines 49-65; and Column 13, lines 43-67.

Subjecting the stream to a decision making algorithm in the bandwidth scheduler based on the extracted flow identity information resulting in that the stream is accepted or rejected before it enters any queue of the switch. In Figure 9, in order to determine which cell 154 is accepted or rejected, processor PL_a logic 180 determines the number of cells currently occupying the rt buffer 166 and nrt buffer 168 and calculates an allowable priority level PL_a . Cell filter 164 then compares the priority level PL 156 of each incoming cell 154 with PL_a . The cell is discarded if $PL > PL_a$; else, it is accepted and placed into a rt buffer 166 or nrt buffer 168. Refer to Column 13, line 39 to Column 14, line 35. Furthermore, a switch always handles a stream of data packets since a source always sends a flow of data packets, not just a single data packet, to a destination.

Kilkki et al do not disclose updating counters corresponding to the stream and subjecting the stream to a decision making algorithm in the bandwidth scheduler based on the updated counters for that particular stream.

Henrion et al disclose in the Figure a plurality of flows C1-C16 that are connected to a selector SEL and a processor P; the selector SEL chooses flows C1-C16 to be output to the common link L based on the output of the scheduler. Refer to Column 9,

line 30 to Column 10, line 6. Each flow C1-C16 is associated with a service grant counter CT1-CT16 and a common guaranteed bandwidth shared data flow counter (GBSDFC). The CT counters contains a flow's current credit amount of service grants for guaranteed bandwidth. For example, each time that the data flow C2 is served for guaranteed bandwidth share, its counter CT2 is decremented until the amount of service grants is exhausted. An active flow can be selected for guaranteed bandwidth share to transmit its next data packet as long as its CT counter has not yet reached zero. Also, a GBSDFC counter records the data flows that are in guaranteed bandwidth share mode or non-guaranteed bandwidth share mode. If the flow is in non-guaranteed bandwidth share mode, an extra service grant counter ECT is associated with the flow, which functions the same as the CT. Refer to Column 17, line 46 to Column 18, line 33; Column 19, lines 36-60; Column 21, line 61 to Column 22, line 4; and Column 23, lines 40-64. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include updating counters corresponding to the stream and subjecting the stream to a decision making algorithm in the bandwidth scheduler based on the updated counters for that particular stream. One would be motivated to do so in order to keep track of the number of service grants a particular flow has so it will not exceed its guaranteed bandwidth share; thereby enabling fair distribution of bandwidth among all active data flows.

Referring to claims 2 and 29, Kilkki et al disclose in Figure 9 that the stream of data includes identifiable data packets (cells 154). The method includes subjecting each cell to a decision making algorithm in the bandwidth scheduler (Figure 9; cell filter

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164 and processor PL_a logic 180) resulting in that the data packet is accepted or rejected. In order to determine which data packet is accepted or rejected, processor PL_a logic 180 determines the number of cells currently occupying the rt buffer 166 and nrt buffer 168 and calculates an allowable priority level, PL_a. Cell filter 164 then compares the priority level PL 156 of each incoming cell 154 with PL_a. The cell is discarded if PL > PL_a; else, it is accepted and placed into a rt buffer 166 or nrt buffer 168. Column 13, line 39 to Column 14, line 35.

Referring to claims 3 and 30, Kilkki et al disclose that the flow identity information includes port, identified by port number, and traffic class. "The source of the packet can be identified by its source IP (internet protocol) address or port in the header of an IP packet, for example" (Column 16, lines 8-10). In Figure 9, each packet 154 also has a real-time/non-real-time (rt/nrt) indicator 158, representing its traffic class. The priority level PL 156 also indirectly represents traffic class, since it is calculated based on whether the connection is real-time or non-real-time. Refer to Column 8, lines 4-27 and Column 13, lines 58-60.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 4, 18, 31, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,549,938 to Kilkki et al in view of U.S. Patent No.

6,469,982 to Henrion et al, and in further view of U.S. Patent No. 6,628,609 to Chapman et al.

Referring to claims 4 and 31, Kilkki et al do not include that a limit is set on the maximum accepted bandwidth per port.

Chapman et al disclose in Figure 4 that each port is assigned a maximum bandwidth. Certain traffic classes, after using up its reserved bandwidth, are able to compete with other permitted classes for any available bandwidth from the port if they have more traffic to send. Refer to Column 9, lines 37-42. In the case that separate traffic classes are competing for spare bandwidth, each class will be limited by the maximum allocated bandwidth settings of each port, thus allowing fair share of bandwidth among ports of a switch. Refer to Column 13, lines 4-20. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to assign a maximum accepted bandwidth per port; the motivation being to allow fair share of bandwidth among ports of a switch, thereby preventing a particularly active traffic flow traveling through a port to utilize all the available bandwidth.

Referring to claims 18 and 45, Kilkki et al do not include that if one traffic class is particularly active, it is forced to give up part of its accepted bandwidth.

Chapman et al disclose a related example of a control mechanism. A traffic class (C2) is utilizing 4 Mb/s of bandwidth, which is over its associated port's (Port A) minimum allocated bandwidth of 1 Mb/s, to transmit upstream data to Port A. Another node needs to transmit downstream data to Port A, so C2 is forced to restrict its data rate to Port A's minimum allocated bandwidth. Refer to Column 22, lines 3-26.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include that if a traffic class becomes particularly active, it must be forced to give up some of its accepted bandwidth; the motivation being that this prevents active traffic flows from utilizing all the available bandwidth, thereby allowing less active traffic flows to achieve their guaranteed minimum bandwidth.

5. Claims 7 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,549,938 to Kilkki et al in view of U.S. Patent No. 6,469,982 to Henrion et al in view of U.S. Patent No. 6,628,609 to Chapman et al, and in further view of U.S. Patent No. 6,292,465 to Vaid et al.

Kilkki et al do not include that there is a maximum accepted bandwidth per traffic class.

Vaid et al disclose that one of the traffic policies includes granting classes "a limit on the total bandwidth used by the class" (Column 13, lines 45-46). When traffic classes are competing for available bandwidth after they have used up all of their reserved bandwidth, a maximum allocated bandwidth prevents a particularly aggressive traffic flow from utilizing too much of the spare bandwidth. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to include a maximum accepted bandwidth per traffic class; the motivation being that this allows fair share of spare bandwidth, thereby preventing aggressive traffic flows from utilizing too much of the available bandwidth. This also helps to control traffic behavior since higher priority traffic classes can be assigned a higher maximum bandwidth allocation.

6. Claims 11 and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,549,938 to Kilkki et al in view of U.S. Patent No. 6,469,982 to Henrion et al, and in further view of U.S. Patent No. 6,292,465 to Vaid et al.

Kilkki et al do not include that each traffic class is guaranteed a bandwidth up to a limit.

Vaid et al disclose that one of the traffic policies includes "granting classes a minimum bandwidth in the presence of congestion or competition" (Column 13, lines 41-43). In case of congestion, each traffic class is guaranteed a reserved amount of bandwidth. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to guarantee each traffic class a bandwidth up to a limit; the motivation being that this guarantees each traffic class a certain amount of bandwidth even in times of congestion, thereby preventing aggressive traffic flows from utilizing all of the available bandwidth. This also helps to control traffic behavior because high priority or critical traffic flows can be guaranteed a minimum bandwidth allocation in case of congestion.

7. Claims 21 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,549,938 to Kilkki et al in view of U.S. Patent No. 6,469,982 to Henrion et al, and in further view of U.S. Publication No. 2002/0097736 to Cohen.

Kilkki et al do not disclose that flows are grouped together by means of a hash function into a set of flow groups.

Cohen discloses in Figure 1 that flows to a processor (Element 50) are grouped together by means of a hash function into a set of flow groups. The use of the hash

function allows the system to "distribute the flows, making sure that packets within the same flow are sent to the same processor so that the original packet order in each flow is maintained" and that different flows are sent to different processors (Element 50).

Refer to Paragraph 0013. The hash function is used because "it distributes packets evenly among the processors in response to flow information such as the source/destination address, source/destination port and the protocol" (Paragraph 0042).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include that flows are grouped together by means of a hash function into a set of flow groups; the motivation being that the hash function allows for flows of a common source and destination to be grouped together and distributed evenly among its destination points in response the flow information.

Allowable Subject Matter

8. Claims 5, 6, 8-10, 12-17, 19, 20, 22-25, 32, 33, 35-37, 39-44, 46, 47 and 49-52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Christine Ng whose telephone number is (571) 272-3124. The examiner can normally be reached on M-F; 8:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Ng *cn*
January 30, 2006


RICKY Q. NGO
SUPERVISORY PATENT EXAMINER